

Attachment 6: Monitoring, Assessment, and Performance Measures

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MONITORING, ASSESSMENT AND PERFORMANCE MEASURES

The 2006 MAC IRWM Plan identified ways in which to measure Plan performance. This involved the use of program-level and project-specific performance measures, including the monitoring of parameters such as pipeline flows and monitoring water quality impacts and benefits on both a basin/watershed basis and on a local basis. Information collected as part of the performance monitoring feeds back into the project's decision-making structure (the project proponent, the Regional Participants Committee and the regional Steering Committee) to allow for project adaptation to better meet both the project's objectives and that of the overall IRWM Plan. Data is also disseminated to the public via the region's website, public workshops and uploads to the State's databases.

The MAC Region is committed to an open public process to ensure a high level of plan performance. Project implementation and performance will be monitored and measured using both program-level and project-specific performance measures in order to demonstrate that the Proposal is meeting its goals (both project-specific and Plan-wide), achieving measurable outcomes, and providing value to California, not only through direct project benefits but through the incorporation of collected data into the Statewide databases. Project-specific monitoring measures have been identified for the projects contained herein; these are discussed further below. These measures will be formalized in project-specific monitoring plans, presenting detailed monitoring, assessment and performance measures for the projects included in this application along with required protocols for data collection and reporting.

There are four projects included in this implementation grant application, the Lake Camanche Tank Rehabilitation & Lateral Replacement Project, the West Point Water Main & Tank Replacement Project, Amador Water System Leak Testing & Repair Program, and the Camanche Regional Water Treatment Plant Phase 1 Project. These four projects are briefly summarized in Table 1.

Table 1: Projects, Proponents, and Descriptions

Project	Proponent	Description
Lake Camanche Tank Rehab & Lateral Replacement	Amador Water Agency (AWA)	Fabricate and install flexible geomembrane liners in five (5) existing, leaking redwood storage tanks in the Lake Camanche Water Improvement District No. 7 (WID#7), and replace 300 linear feet of the polyethylene service laterals in the system.
Amador Water System Leak Testing & Repair Program	Amador Water Agency	Implement a system of 18 “master meters” on key pipelines with the Amador Water System to determine which lines are experiencing the greatest water loss and require replacement or repair.
West Point Water Main & Tank Replacement	Calaveras County Water District (CCWD)	Replace 6,600-feet of CCWD’s deteriorating water main and construct a new 50,000-gallon steel water storage tank to replace the leaking redwood water storage tank in West Point.
Camanche Regional Water Treatment Plant	East Bay Municipal Utility District (EBMUD)	Phase 1 project to install 6,000 feet of 12-inch diameter HPDE pipeline from the Mokelumne Aqueducts to the existing Camanche water treatment plant, and ultimately to a new regional water treatment plant. Overall project components (all phases) include a 0.5 MGD membrane filtration water treatment plant at Camanche South Shore Recreation Area (CASS), a new raw water pipeline (the Phase 1 project), and a new cross-Camanche Reservoir treated water pipeline from CASS WTP to Camanche North Shore Recreation Area (CANS).

Three of the four projects proposed in this grant application are water-loss reduction projects (the Lake Camanche Tank Rehabilitation & Lateral Replacement Project, the West Point Water Main & Tank Replacement Project, and the Amador Water System Leak Testing & Repair Program) having a primary goal of reducing water losses within specific areas of the CCWD or AWA water systems. For both the Lake Camanche Tank Rehabilitation & Lateral Replacement Project and the West Point Water Main & Tank Replacement Project, the areas to benefit from the new infrastructure are the disadvantaged communities of Lake Camanche Village and West Point. Performance measures that will be used for these water loss reduction projects include measuring flows through pipelines (laterals), master meters on water mains, and water level gauges on storage tanks to calculate water loss reductions within the water supply systems post project execution (either as percentage decreases in loss or savings in acre-feet of water), and comparing pre- and post-project water levels in the storage tanks. Increased storage and reduced water system losses will provide increased water system reliability and will minimize costs to the water agencies both through lost revenue and reduced maintenance on the aging infrastructure. In the long-term, reducing system water losses will minimize the need for future water projects to meet increased water demands.

Monitoring for the three water loss reduction projects will occur throughout the entire water systems, as well as at the specific location of the project improvement, wherever possible. For example, AWA will monitor overall water losses throughout its water system, but also

collect data to estimate water loss from the rehabilitated redwood tanks. These numbers will be compared to existing estimated losses in order to determine if there are improvements and if goals are met. Data will be collected via the systems' water meters (both existing and proposed); the data collected will be compiled monthly and analyzed regularly. This information will periodically be distributed to the Upper Mokelumne River Watershed Authority (UMRWA, the Regional Water Management Group) for review and discussion.

The fourth project in this grant application is the EBMUD Camanche Regional Water Treatment Plant Phase 1 project. The primary goals of this project are multi-faceted; that is, the Phase 1 project described herein (the Mokelumne Aqueduct Supply to CSS WTP Pipeline) will provide stand-alone primary goals that are in addition to the primary goals of the Camanche Regional Water Treatment Plant Project as a whole. The Phase 1 project will, alone, provide a reliable, long-term high-quality supply of water to the existing Camanche Water Treatment Plant. The reduced bacterial loading on the existing water treatment plant will improve the plant's performance, reduce the number of violation notices that have been occurring at the aging treatment plant, and provide a better-quality water to local users. Once the new water treatment plant has been constructed, along with the cross-Camanche pipeline (subsequent phases of the larger project), the overall project will not only continue to provide high-quality water to the Camanche South Shore Recreation area, but will also be providing a similar high-quality supply to the Camanche North Shore Recreation Area, Burson, Wallace, and other near-by communities. Performance measures to be utilized for the Phase 1 project include the number of non-compliance notices received at the existing water treatment plant and the volume of water delivered annually through the new pipeline (in acre-feet per year).

All four projects proposed herein work to help fulfill objectives and meet goals outlined in the 2006 MAC IRWM Plan. Each of the three water-loss reduction projects addresses the Water Supply Objectives of:

- Meeting 100% of urban water demand in both wet and dry years;
- Optimizing surface water from the Mokelumne and Calaveras Rivers; and
- Providing a reliable supply of water to meet alternative water uses (such as fire suppression).

The fourth project, the Camanche Regional Water Treatment Plant Phase 1 Project, addresses the following Water Quality Objectives identified in the 2006 MAC IRWM Plan.

- Meet or exceed all applicable water quality regulatory standards; and
- Meet or exceed urban water quality targets established by stakeholders.

By implementing the tools and methods summarized in the tables below, each project proponent can identify when their projects may not be fulfilling the project's and/or the Region's goals and objectives. The information and data collected will be fed back into the project's management structure to adapt the project to better meet its overall objectives. Only by consistent monitoring and analyzing project performance feedback data can

projects successfully achieve the objectives set for the project. Monitoring will also provide a clear reporting mechanism for the public, decision makers, and regional planners to determine the planned versus actual value of the project.

Each project proponent will have the primary responsibility for developing a project-specific monitoring plan for their project, and for collecting the data and performing the monitoring activities described below. The project-specific monitoring plans will be prepared for each project following funding agreement execution, and will be submitted to DWR as part of the funding administration documentation. Each monitoring plan will have protocols and methodologies to ensure consistency and accountability by the designated party collecting the data and performing monitoring activities. UMRWA will act as the overseeing entity, ensuring that each project proponent prepares its project-specific monitoring plan(s) and implements the plan accordingly. The monitoring plans will include monitoring schedules, dictating an estimated timeline of monitoring activities, which UMRWA will use as a guideline for overall program implementation. Data collected and analyses performed as part of the performance monitoring plans will be reported UMRWA on a quarterly basis, providing required documentation and proof of project performance. This will help ensure the projects meet the goals as originally conceived for the projects and the MAC Region's overall IRWM Plan.

The following tables (Table 2 through Table 5) are the Project Performance Tables for the four projects included in this proposal. The Project Performance Tables present the following information:

- Project goals
- Desired outcomes
- Output indicators - measures to effectively track output
- Outcome indicators - measure to evaluate change that is a direct result of the work
- Measurement tools and methods
- Targets to be achieved within the life of the proposal

The information included in each Project Performance Table will provide a basis for the project-specific monitoring plan to be developed.

Table 2: Lake Camanche Tank Rehabilitation & Lateral Replacement Project Performance Measures Table (AWA)

Project Description	Fabricate and install flexible geomembrane liners in five existing, leaking redwood storage tanks in the Lake Camanche Water Improvement District No. 7 (WID#7) and replace 300 linear feet of polyethylene service laterals in the system.	
Project Goals	<ul style="list-style-type: none"> • Reduce and minimize system water loss/waste within the system • Increase storage volumes in tanks • Improve water quality of stored water • Improve water supply reliability 	
Desired Outcomes	<ul style="list-style-type: none"> • Reduced maintenance requirements • Minimized lost revenue • Reduced needs for new sources • Reduction in system losses • Improve water supply reliability 	
Output Indicators	<ul style="list-style-type: none"> • Readings from master water meters • Readings from lateral water meters • Readings from tank gauges • Analytical laboratory reports 	
Outcome Indicators	<ul style="list-style-type: none"> • Volume of water saved annually (in MG) • Increased water levels in storage tank (in feet) • Reduction in bacteria concentrations (in MPN/100mL) 	
Measurement tools and methods	<p><u>Tool</u> – Master meter measurements at tank</p> <p><u>Tool</u> – Flow meter measurements at lateral</p> <p><u>Tool</u> – Gauge readings at tanks</p> <p><u>Tools</u> – Laboratory analyses</p>	<p><u>Methods</u> – Compare meter readings with lateral meter readings to calculate water losses. Compare pre- and post-retrofit data calculations</p> <p><u>Methods</u> – Same as above</p> <p><u>Methods</u> – Compare pre- and post-retrofit gauge readings to determine % increase in storage volume resulting from retrofit</p> <p><u>Methods</u> – Compare water quality results for indicator analytes from pre- and post-retrofit water samples; calculate % reduction in constituent concentration</p>
Target	<ul style="list-style-type: none"> • Reduce water lost from tanks by 8% and water lost from laterals by 3% • Increased nominal storage volume of tanks by 45,000 gallons • Reduced loading of bacteria to stored water by 35% to 55% 	

Table 3: Amador Water System Leak Testing & Repair Program Performance Measures Table (AWA)

Project Description	Implement a system of 18 “master meters” on key pipelines with the Amador Water System to determine which pipes experience the greatest water loss and require replacement or repair.	
Project Goals	<ul style="list-style-type: none"> • Identify significant leaks in the AWS • Minimize system water losses • Minimize associated revenue loss • Postpone new water supply projects 	
Desired Outcomes	<ul style="list-style-type: none"> • Reduce water loss within AWS • Maximize existing water supplies • Improve water supply reliability 	
Output Indicators	<ul style="list-style-type: none"> • Number of master meters installed • Flow readings from new master meters 	
Outcome Indicators	<ul style="list-style-type: none"> • Volume of water saved annually (in MG) 	
Measurement tools and methods	<u>Tool</u> – District water use records	<u>Methods</u> – Calculate average year water use at different parts of the AWS water system; identify locations of significant leaks
Target	<ul style="list-style-type: none"> • Repair water system leaks with between 1 and 20 gallons per minute or greater • Reduce overall AWS water system loss by 3% in future project phases 	

Table 4: West Point Water Main & Tank Replacement Project Performance Measures Table (CCWD)

Project Description	Replace 6,600-feet of CCWD's deteriorating water main and construct a new 50,000-gallon steel water storage tank to replace the leaking redwood water storage tank in West Point.	
Project Goals	<ul style="list-style-type: none"> • Reduce and minimize system water loss/waste within the system • Improve water supply reliability 	
Desired Outcomes	<ul style="list-style-type: none"> • Reduced maintenance requirements • Minimized lost revenue • Reduced needs for new sources • Reduction in system losses • Improve water supply reliability 	
Output Indicators	<ul style="list-style-type: none"> • Readings from master water meters • Readings from lateral water meters • Readings from tank gauges 	
Outcome Indicators	<ul style="list-style-type: none"> • Volume of water saved annually (in MG) • Increased water levels in storage tank (in feet) 	
Measurement tools and methods	<p><u>Tool</u> – Master meter measurements at tank</p> <p><u>Tool</u> – Flow meter measurements at lateral</p> <p><u>Tool</u> – Gauge readings at tanks</p>	<p><u>Methods</u> – Compare meter readings with lateral meter readings to calculate water losses. Compare pre- and post-retrofit data calculations</p> <p><u>Methods</u> – Same as above</p> <p><u>Methods</u> – Compare pre- and post-retrofit gauge readings to determine % increase in storage volume resulting from retrofit</p>
Target	<ul style="list-style-type: none"> • Reduce water losses from tanks and laterals by 10% • Increased volume of stored water by 25,000 gallons 	

Table 5: Camanche Regional Water Treatment Plant Phase 1 Project Performance Measures Table (EBMUD)

Project Description	Construct new 6,000-feet long, 12-inch diameter HDPE pipeline from Mokelumne Aqueduct to surface water treatment plant.	
Project Goals	<ul style="list-style-type: none"> • Provide a long-term reliable high-quality potable water supply to Lake Camanche and local communities • Improve performance of existing Camanche water treatment plant • Complete Phase 1 of Camanche Regional Water Treatment Plant 	
Desired Outcomes	<ul style="list-style-type: none"> • Reduce non-compliance at existing Camanche Water Treatment Plant • Improve water supply reliability 	
Output Indicators	<ul style="list-style-type: none"> • District operating records for existing Camanche Water Treatment Plant • Metering data records for new pipeline 	
Outcome Indicators	<ul style="list-style-type: none"> • Number of violation notices • Number of acre-feet of water delivered 	
Measurement tools and methods	<u>Tool</u> – District water treatment plant records <u>Tool</u> – Pipeline meter records	<u>Methods</u> – Comparison of number of violations before and after pipeline installation <u>Methods</u> – Summary of number of acre-feet of water delivered through the new pipeline
Target	<ul style="list-style-type: none"> • Operate the existing Camanche Water Treatment Plant to meet California Department of Public Health requirements • Delivery of 82 acre-feet of water annually through new pipeline 	